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Remarks on the Determination of the Parallactic Inequality of the Moon. By Simon Newcomb.

The following remarks are suggested by the papers of Professor Turner and Mr. Cowell in the December and March numbers of the *Monthly Notices* (vol. lxiv., Nos. 2 and 5). They relate to sources of possible systematic differences between the results of meridian and altazimuth observations of the Moon and possible systematic errors in a determination of the parallactic inequality which are not fully considered in the papers referred to.

Beginning with the meridian observations, it is necessary, in order to have a determination of the parallactic inequality free from systematic error, that all the observations used should be free from such systematic errors as are a function of the age of the Moon. The practical semi-diameter of the Moon, as it enters into the meridian observations, should not be regarded as a constant. Saying nothing of personal equation, which we assume to be eliminated from the mean during any half-lunation, the practical semi-diameter of the Moon is the true semi-diameter augmented by radiation. The latter is a function of the contrast between the brightness of the Moon's limb and that of the sky. It is therefore greater after the end of twilight and least when the Sun is above the horizon. It will also be less at the full moon on account of the greater obliquity at which the rays strike, and from the fact that the illumination of the extreme limb will be deficient, owing to many points on it being thrown into shadow when the observer is not practically in line with the Sun. For this reason we must expect the semi-diameter determined from transits to be too small. Under these circumstances it seems to me the best result of meridian observations is to be obtained by throwing out all observations made during daylight, and eliminating the correction to the semi-diameter from the equations themselves. I am inclined to think that we should get the best results if the discussions were confined to observations between November 1 and February 15. Each observation would give an equation of condition between the corrections to the semi-diameter and to the parallactic inequality.

The altazimuth observations are liable to errors, which are a function of the azimuth, unless the errors of graduation are determined and the instrument is so constructed as to be perfectly free from wabble. Observations with this instrument near and before the time of first quarter will commonly be made in the south-west or west, while those near the third quarter will be made in the south-east or east. We must also recognise the possibility of systematic errors in altitude as well as those of semi-diameter. A little consideration will show the following results of these errors:—

1. A constant error in altitude will have opposite effects

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on the Moon's longitude at first and third quarters. It will therefore enter with its full effect into the parallactic inequality, but will be eliminated from the mean longitude.

2. Since all the observations of altitude must be made on the Moon's lower limb, the effect of error of semi-diameter will be the same as that of the altitude.

3. The errors in azimuth will practically have the same effect as those in right ascension, both as regards the limb and the errors which are a function of the azimuth itself.

For these reasons we must not expect the two methods to agree. Until we free the altazimuth observations from the source of error in question, it seems to me not safe to rely upon them for the parallactic inequality. To do this requires a more careful study of the instrument and the method of using it than I am aware of having been made.

Washington: 1904 *May* 11.

Methods of Correcting Moon's Tabular Longitude.

By P. H. Cowell.

In previous papers I have given a list of about a dozen corrections applied to Hansen's tabular longitudes from 1847·0 onwards. I now give a list of corrections to Airy's tabular longitudes, 1750–1851, that have already been entered, though the additions have not as yet been completed.

Terms whose arguments are multiples of the same angle are combined in one table, and in the following list are given under a single reference number; for example, the first table applies the correction

$$-2''{\cdot}58 \sin D - 0''{\cdot}20 \sin 2D - 0''{\cdot}37 \sin 3D - 0''{\cdot}46 \sin 4D$$

all at once.

The only exception to this is the terms in g' and $2g'$, where the secular variation of the former made it necessary to treat the latter separately.

The first list contains terms of short period; the second list terms of longer period:

Ref. No.	Argument.	Coefficient of Correction Applied.	Coefficient used by Airy *plus* Coefficient of Correction.	Remarks.
1	D	−2″·58	+ 124″·68	Parallactic Inequality
1	2D	−0·20	− 2370·10	Variation
1	3D	−0·37	+ 0·53	
1	4D	−0·46	+ 13·94	

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